Small Business Innovation Research/Small Business Tech Transfer

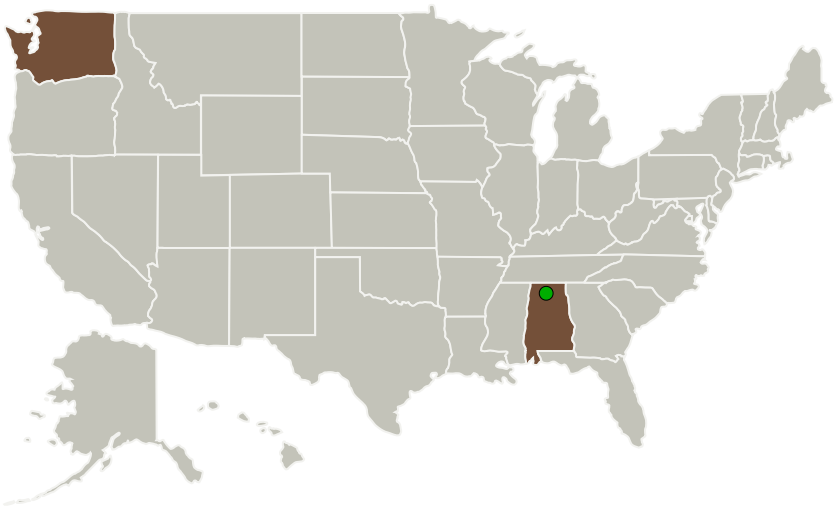
Metal Advanced Manufacturing Bot-Assisted Assembly (MAMBA) Process, Phase I

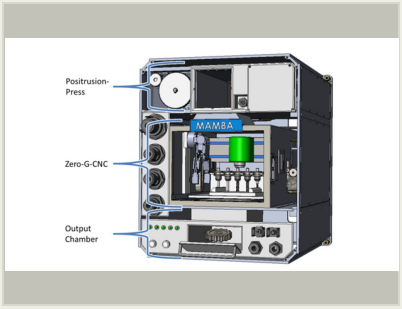
Completed Technology Project (2017 - 2017)

Project Introduction

Tethers Unlimited, Inc. (TUI) proposes to develop the Metal Advanced Manufacturing Bot-Assisted Assembly (MAMBA) Process, a robotically managed metal press and milling system used to create precision parts on orbit. This manufacturing process provides an alternative to 3D printing metals in space, which is difficult due to space environment or print quality issues. Instead, the MAMBA-Process relies on an ingot forming technology to create a metal ingot. This ingot can then be milled and machined to form a precision part using a standard CNC milling technique. In order to minimize astronaut time and exposure to the process, the MAMBA-Process will be outfitted with a robotic assistant, using robotic assistance to remove the ingot from the press, to place the ingot in the mill, and to perform tool changes on the mill. The MAMBA effort will also develop a novel process for management and recycling of metal chips in a microgravity environment. Testing of the process technologies will lead to a lab demonstration of ingot formation and milling in the Phase I effort, maturing the MAMBA Process to TRL-3. In the Phase II effort, a full scale engineering unit will be built and tested to begin validating this technology for flight.

Primary U.S. Work Locations and Key Partners





Metal Advanced Manufacturing Bot-Assisted Assembly (MAMBA) Process, Phase I Briefing Chart Image

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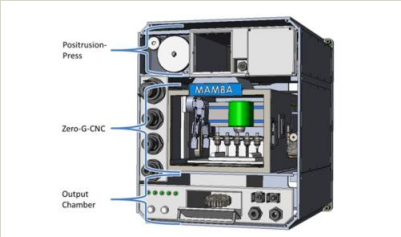
Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Washington

Images



Briefing Chart Image
Metal Advanced Manufacturing Bot-Assisted Assembly (MAMBA) Process, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/133901)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Tethers Unlimited Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

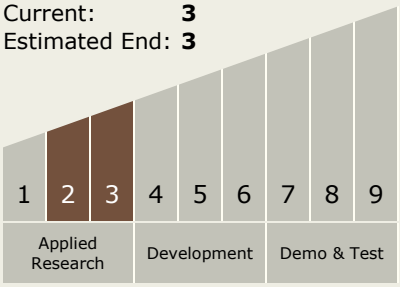
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Rachel Muhlbauer

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.1 Manufacturing Processes